

Detection of an ENSO Signal in Seasonal Atmospheric Angular Momentum Variations

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Global warming, by definition, changes the atmospheric temperature field. Since this temperature change is not expected to occur uniformly, either geographically, or with height in the atmosphere, changes can be expected in the pole-to-equator temperature gradient which, by the thermal wind equation, will cause changes in the atmospheric zonal wind field and hence in the wind-driven axial component of the atmospheric angular momentum (AAM). On interannual time scales numerous studies have shown that AAM variations are negatively correlated with the Southern Oscillation Index (SOI). Here, observed changes in the strengths of the annual and semiannual AAM signals during 1976–1995 are analyzed and shown to be significantly correlated with the SOI. This reported correlation between the SOI and the modulation of the seasonal AAM signals demonstrates a linkage between seasonal AAM (and hence seasonal zonal wind) variability and the El Niño / Southern Oscillation (ENSO) phenomenon, a linkage that can only arise through non-linear interactions.